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ABSTRACT

Teaching and testing for critical thinking can be a challenge for new and experienced social work educators because critical thinking has no operational definition. Bloom's Taxonomy of Educational Objectives is a tool from the wider context of education that can help new and experienced social work educators to think more precisely about what it means to teach and test for critical thinking. Bloom's Taxonomy includes six knowledge levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. This survey paper presents each level along with sample test items. Cites 17 resources. (Author/BB)

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TITLE

Teaching and Testing for Critical Thinking with Bloom's Taxonomy of Educational Objectives

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### ABSTRACT

Teaching and testing for critical thinking can be a challenge for new and experienced social work educators because critical thinking has no operational definition. Educational objectives commonly include the word "understanding," but this word is vague and impractical for classroom use. What does understanding mean and how do social work educators recognize and test for it?

Bloom's Taxonomy of Educational Objectives is a tool from the wider context of education that can help new and experienced social work educators to think more precisely about what it means to teach and test for critical thinking. Bloom's taxonomy includes six knowledge levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. These taxonomy levels are presented along with sample test items. Since achieving critical thinking is neither an easy nor automatic process, the cautions social work educators should consider when teaching and testing for higher knowledge levels are addressed.

## PROBLEM

The importance of accountability and measuring student outcomes is a current theme in social work education. Focusing on clear student outcomes should encourage social work educators to think more precisely about what we teach and test in the social work classroom. However, social work educators who wish to go beyond teaching and testing for memorization or "rote" learning will find that "critical thinking" has no clear operational definition and is too broad a term for practical use in the social work classroom (Bloom, 1956; Wiggins & McTighe, 1998). Critical thinking is a theoretical construct and social work educators must measure behaviors that point to it (Bloom, 1956). This may be why educators can experience difficulty writing exam questions that do more than test for simple memorization or comprehension. As social work educators, we do not lay claim to the term critical thinking. Rather, we belong to a larger community of professional educators who are also aware of the importance of going beyond having students memorize material, to having students "understand" material related to higher or deeper levels (Bloom, 1956; Wiggins & McTighe, 1998). However, what is "understanding" and how do we recognize it in the social work classroom?

There are many tools from the wider context of education that offer social work educators, especially new ones, a context from which to "think" about critical thinking. One such tool is the Taxonomy of Educational Objectives (Bloom, 1956). The taxonomy of educational objectives can help social work educators to more precisely define the outcomes expected from our

undergraduate students on exams and to create educational materials consistent with our learning expectations and conceptions of critical thinking. The six knowledge levels of the taxonomy of educational objectives are presented along with sample test items. Cautions that social work educators must consider when teaching and testing for critical thinking also are described.

### INTRODUCTION

The Taxonomy of Educational Objectives (1956) is often simply called Bloom's taxonomy. The taxonomy was intended to offer all educators a way to classify and talk about educational objectives (Bloom, 1956). The taxonomy was written to add clarity and precision to the potentially challenging task of writing educational objectives. Educational objectives referring to students "knowing about" or "understanding" a topic are common in education, but are too broad to guide teaching and testing. For example, how will social work educators know when students "understand" a topic and what kinds of test questions verify that students "understand" a topic?

Bloom's taxonomy does not explicitly define critical thinking. Rather, it includes six knowledge levels that constitute the construct of critical thinking. The six knowledge levels can help social work educators to clarify what critical thinking and "understanding" mean. For example, we could define critical thinking as translating technical jargon into common English (comprehension), applying problem-solving skills to new situations (application), making inferences about the impact of social policy (analysis), producing intervention plans based on client problems (synthesis), or evaluating the appropriateness of intervention

methods (evaluation). This precision can make it simpler to align what we teach with what we test.

The taxonomy applies to all materials in the social work curriculum, including the knowledge courses (e.g., introductory courses), skill courses (e.g., practice methods) and field instruction. The taxonomy also can be utilized with either the supply or choice test item format. The supply format requires students to recall information from memory and supply correct answers because the answers are not present for students to view. The completion, short answer, and essay testing formats, and written projects are examples of the supply format. The choice format requires students to recognize correct answers from among incorrect choices, i.e., the multiple choice, true/false, and matching formats where students view correct answers among incorrect answers. The multiple-choice format is utilized here because it can test all but the synthesis level of the taxonomy while avoiding scoring and inter-rater reliability problems. Readers should bear in mind that the multiple choice format can easily be converted into the true/false, short answer, or essay format depending on social work instructor preferences.

### **BLOOM'S TAXONOMY**

Figure one shows the six knowledge levels of the taxonomy arranged from the lowest knowledge level (knowledge) to the highest (evaluation), along with verbs associated with common student tasks at the knowledge levels (Bloom, 1971; Green, 1970, 1975). The knowledge levels are discrete and mastery of one level does not insure that students can automatically perform to higher levels. For

example, simply knowing the elements of an intervention plan (knowledge) does not guarantee that students can produce one (synthesis) or critique one (evaluation). Teaching and testing are therefore linked, and teaching must support whether testing, for example, requires recognition of the name "Mary Richmond" (knowledge) or requires a critique of her contribution to social work (evaluation).

Figure 1. Bloom's Taxonomy and Common Student Expectations

| Knowledge Level | Common Student Expectations   |
|-----------------|---|
| Knowledge       | Define, identify, state, list, differentiate, discriminate, recognize |
| Comprehension   | Explain, translate, interpret, match, extrapolate                     |
| Application     | Construct, choose, predict, demonstrate                               |
| Analysis        | Distinguish, separate, organize, infer, classify                      |
| Synthesis       | Compose, formulate, create, produce                                   |
| Evaluation      | Debate, judge, critique, assess, compare                              |

Note: Adapted from: Bloom, 1971; Green, 1970, 1975.

### Knowledge

Knowledge is the lowest or simplest taxonomy level. Knowledge can be considered the facts or information students must learn. Knowledge is probably the most common level tested in higher education because instructors can simply use a textbook to determine what "knowledge" students must learn and create exams targeted to a textbooks' contents (Bloom, 1956). If a social work educator wants more detail at the knowledge level, the taxonomy further classifies knowledge into the following categories: (a) knowledge (of) (specifics, terminology, specific facts), (b) knowledge of ways and means of dealing with

specifics (conventions, trends and sequences, classifications or categories, criteria, methodology), and (c) knowledge of universals and abstractions of a field (principles and generalizations, theories and structures).

Figure one includes verbs associated with tasks students are often expected to perform at the different knowledge levels. The verbs can help social work educators to align their educational objectives with their classroom activities and ultimately their test items where students must demonstrate that they learned the material to the desired knowledge level.

Creating items that tap knowledge can be as simple as taking the key point or word out of a sentence and making it a choice among multiple choices or by simply having students decide if a sentence is true or false. A sentence also could easily be turned into a completion item by omitting a key word or phrase that students must supply.

Figure 2. Knowledge Level Test Items

---

|   |            |               |            |
|---|------------|---------------|------------|
| 1) What is the Social Work professional organization called?                                    | NASW **    | CSW           | CSWE       |
|   | DSW        | AMA           |            |
| 2) How much is the current food budget from the poverty line?                                   | \$1.00     | \$3.00        | \$ .89     |
|   | \$1.98     | \$1.19 **     |            |
| 3) Respectively, which choice shows the strongest positive, and strongest inverse correlations? | -1.0, -.20 | +.96, -.89 ** | -.99, +1.0 |
|   | +.96, -.79 | +.96, +.05    |            |

---

In item one of figure two, students must recognize the acronym for the social work professional organization from among other choices. Alternatively, instructors could include a clearly incorrect choice (e.g., REM) or humorous choice (e.g., WWF) to lessen test anxiety. However, eliminating potential choices makes the item less difficult. Item two requires students to recognize a number integral to the measurement of poverty (Schiller, 1998), and item three does the same but with correlation coefficients (Williams, Unrau & Grinnell, 1998).

A criticism of testing and teaching only at the knowledge level is that students can simply put information into an easier to recall form and "memorize without understanding" (Gentile, 1990). For example, as children turn the letters EGBDF into a sentence to recall musical notes, my students use MRCOS and JAHH to recall aspects of social work history (MRCOS = Mary Richmond Charity Organization Society; JAHH = Jane Addams Hull House). Since the knowledge levels are discrete, memorizing MRCOS will not enable students to discuss Mary Richmond's impact on social work.

Making knowledge questions challenging without making them "tricky," as students say, can be difficult (How do we make a "fact" harder?). One strategy is to "hide" essential material within material not intended for testing. The learning task becomes increasingly difficult because students must learn a greater volume of material or correctly guess what material will be tested (e.g., Will our professor test us on the textbook, the lectures, or both?). Students who memorize a greater volume of material than other students may not necessarily have greater understanding. Another strategy to make knowledge items more challenging is

to have students make finer discriminations between response choices. For example, the choices in the NASW item in figure one could read: NAWS, NSWA, NASW, NWAS, NWSA. Students reading quickly could select an incorrect choice because they all contain the correct letters but in the wrong order. Similarly, answering the item correctly does not mean students understand the purpose of NASW.

### **Comprehension**

Comprehension involves having students demonstrate they, for lack of a better word, understand material by doing more than simply memorizing and repeating it. Aspects of comprehension involve translation, interpretation, and extrapolation. Translation involves translation of learned material into a different, but correct, form. I often have students translate social work terminology into "plain English" clients would understand to demonstrate comprehension. I must make judgments about the correctness of the translations and supply alternate examples if the student examples are poor. Interpretation involves summarization of learned material or examining material from different views. In my research course students must interpret tables of results by first translating the results into "plain English" and by summarizing and explaining what the results mean. I also have students interpret the results from different views, i.e., the client and social work agency. Extrapolation involves identifying trends and consequences. I often have students describe intended and unintended consequences of social policies or legislation to verify that they can identify consequences.

Figure 3. Comprehension Level Test items

- 
- 1) Which of these poverty theories is politically the most progressive?
- |                            |                           |                          |
|----------------------------|---------------------------|--------------------------|
| Genetic Inferiority Theory | Functionalist Explanation | Orthodox Economic Theory |
| Subclass Theory **         | Culture of Poverty        |                          |
- 2) "Statistical significance" means what?
- Decreased odds that results are due to "chance" \*\*
  - The measures used have external validity
  - The study has internal validity
  - Increased odds that correct statistics were employed
  - The study was conducted in a reliable manner
- 3) What should the **plan of action** include to help clients see they are making progress?
- |                              |                                      |
|------------------------------|--------------------------------------|
| Short and long term goals ** | Partializing and prioritizing        |
| Listening and empathy        | Assessment and information gathering |
| Objectivity and feedback     |                                      |
- 

In figure three, item one shows that students must recall conservative, liberal, progressive ideologies (Macht & Quam, 1986), recognize the listed poverty theories (Schiller, 1993; Waxman, 1983) and match the theories with their political orientation. In item two students must recognize an interpretation of "statistical significance" that utilizes non-technical language. Students cannot answer this item correctly by simply recalling the association between "statistical significance" and the symbol  $p < .05$ . Item three requires students to recognize which element of an intervention plan has the described purpose.

A comprehension question can accidentally be reduced to a knowledge question if the task expected on testing is completed in class. For example, students could simply recall how the poverty theories were sorted in class without comprehending why. To avoid this, a social work educator could sort some, but

not all, of the theories in class, or simply tell students they must sort the poverty theories by political ideology on the exam.

### **Application**

Application involves carry-over or transfer of learning to new situations or situations new to the students. Application is an important knowledge level for social work since students must eventually apply what they learn to the problems clients will present. Similarly, I expect my research students to apply their learning to research studies they will encounter in the social work literature. Students practice application if we present them with new situations where they must apply their learning. For example, I often have students create new examples of essential concepts from their home lives and work lives, and eventually from social work contexts different from my examples. I must judge if their examples are valid and either correct them or supply other examples.

Creating different scenarios for teaching and testing involves advance preparation and can be time consuming. However, using the same example or scenario for teaching and testing means students may memorize the example without understanding it. For example, if I demonstrate "setting priorities" using an example of domestic violence and utilize the same example on testing, students may simply associate "setting priorities" with domestic violence to answer test items (e.g., When you see a question about domestic violence, choose the answer with setting priorities.).

Figure 4. Application Level Test Items

|   |  |                      |
|---|--|----------------------|
| 1) Donald Duck doesn't think Goofy will be a good Disneyland tour guide and chooses Mickey instead. What is this called?  |  |                      |
| Good Judgment   | Causation Loop **                      | Institutional Racism |
| Institutional Discrimination  | All of the above                       |                      |
| 2) Respectively, what type of communication occurs in these three statements?<br>(a) "Your child has acute exogenous bromadrosis but...<br>(b) "Don't feel bad because...<br>(c) "We have seminars for people who want to be better parents." |  |                      |
| Cliche, labeling, professionalitis  | Cliche, professionalitis, labeling     |                      |
| Labeling, professionalitis, cliché  | Professionalitis, cliches, labeling ** |                      |
| Professionalitis, labeling, cliches   |  |                      |
| 3) Identify the variables in the order they occur in this research study: "The effects of hanging on demonic possession in Quakers & Pilgrims"  |  |                      |
| Dependent, Control, Independent   | Independent, Control, Dependent        |                      |
| Independent, dependent, control **  | Control, dependent, independent        |                      |
| Control, independent, dependent   |  |                      |

In figure four, item one requires students to recall the definition of a causation (or feedback) loop and apply it to a scenario very different (e.g., cartoon characters) from the one utilized in class. Item two involves recalling specific communication errors and applying them to a novel set of communications (Eriksen, 1979). The question could easily be rewritten to have a definition in the question and novel examples as the response choices. Item three requires students to apply research concepts to a novel and humorous research study (Ellenbogen, 1993). Alternatively, the short answer or essay format could easily require students to write their answers (e.g., Describe how the Social Security Act would have been different if President Reagan wrote it.).

### **Analysis**

Analysis requires examination of parts or elements of what was learned, analyzing the relationship between wholes and parts (e.g., conclusions and evidence) or organizing knowledge based on some principle. It also can involve making inferences based on data. I often draw conclusions from research studies and have students determine if the conclusions are supported by the results. I also have students make inferences on what the writers of social policy may have thought based on their proposals (e.g., What could President Hoover have been thinking when he wrote this legislation.). Students can also organize what they have learned based on some criteria or principle. I have students organize social programs by whether they are residual or institutional (Wilensky & Lebeaux, 1958) and have students locate and organize research studies based on purpose (exploratory or descriptive) or whether quantitative or qualitative data collection methods were employed (Williams, Unrau & Grinnell, 1998). Social work educators may use any desired organizing principle to analyze any course material. I often do this when students wish to discuss current or newsworthy events to add focus to the discussions (e.g., examining school shootings from different perspectives).

Figure 5. Analysis Level Test Items

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1) Turn to the study on page 132 in your text. "All the perpetrators of sexual abuse in this study were first time offenders". Does the data in table C support this claim?

- Yes, the data supports the claim
  - No, the data does not support the claim \*\*
  - The data partially supports the claim
- 

2) Based on what President Roosevelt did in the New Deal, he probably thought:

- Social programs were giving too much money in aid to the poor
  - There was a general lack of work ethic being caused by social welfare programs
  - Helping the poor would make the economy worse than it already was at the time
  - Poverty was linked to the economy so government should help the poor \*\*
  - Poverty was solved by a strong individual work ethic
- 

3) Examined from an ideological perspective, which one does not belong with the others regarding the view of the poor?

- |                             |                       |
|-----------------------------|-----------------------|
| Elizabethan Poor Law – 1601 | Grant in Aid Programs |
| War on Poverty              | Puritan Work Ethic ** |
| Speenhamland Act            |                       |
- 

In figure five, Item one requires students to determine if a valid conclusion has been drawn from a table of statistical results. Item two has students infer what an American president thought based on legislation he proposed. These items can be created utilizing the myriad of historical figures and events related to social work. In item three, students must utilize political ideologies to reorganize historical events related to poverty to determine which choice does not belong with the others. As with the other knowledge levels, the items are reduced to the knowledge level if this exact material is taught in class because students can simply memorize the answers.

### **Synthesis**

Synthesis may be thought of as creativity because it involves the production of things that are new or unique. Synthesis is an ideal knowledge level for social work since much of our work involves the production of professional documents, intervention plans, communications, and the display of skills in unique combinations in response to client situations.

Writing objective format test questions for synthesis can be difficult. The creative demonstration of learning and skills lends itself more to the essay format. Another way to assess if students can perform a skill or complete a task is with performance assessment where students actually perform a skill or complete a task (e.g., conduct a research study or client interview). This method assumes that the best test of whether a student can perform a skill or task is to have students actually perform it (Wiggins & McTighe, 1998). Student portfolios are ideal for synthesis as students would collect or perform new work that demonstrates their social work skills.

Figure 6. Synthesis Level Test Items

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1) Multi-part Essay Question

- Create a new way or improve how we currently deal with poverty in America. Your suggestions must include a RATIONALE.
- If your suggestions have been tried before in history (and they probably have in some form) how will you overcome the problems they encountered?
- What are the problems with your suggestions and what could you do to overcome these problems?
- Suggest an alternative policy that would be more progressive than what you just proposed and identify reasons why someone would support it.

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2) Written Project

- Produce an audiotape and process recording of a client interview you conduct with a classmate who portrays a client from your field placement.
  - Write a psychosocial assessment of the client you interviewed. Supplement material you did not have time for in the interview.
  - Create an intervention plan based on the psychosocial assessment you did from your client interview.
- 

Item one in figure six requires students to suggest a new or improved way to handle American poverty. Students also identify weaknesses in their suggestions and view their work from a specific ideological position. Item two requires students to perform a client interview, a process recording and a psychosocial assessment to demonstrate communication and writing skills. Any project or written assignment involves synthesis if it requires students to demonstrate social work skills. Similarly, instead of writing multiple choice items for the synthesis level, my research students actually write research proposals and projects. Said differently, if you want to determine if a student can perform a skill, test them by making them perform the skill.

## Evaluation

Evaluation requires students to make judgments based on external criteria or internal evidence. Social work educators must give the students the external criteria and demonstrate how to utilize it to render judgments so students can practice this skill. Evaluative criteria exists for judging the soundness of research projects and hypothesis, judging the correctness of communication and responding skills, judging the correctness of ethical decisions, etc. I often have students evaluate ethical dilemmas with an ethical ladder of priorities (Loewenberg & Dolgoff, 1988). The ladder has seven rungs and I often have students utilize it to examine and create ethical dilemmas (e.g., Does right to privacy supercede protection of life? Is it wrong if a state trooper tells a family that a victim died instantly instead of sharing gory details?). The social work code of ethics also lends itself to the evaluation knowledge level.

Evaluation with internal evidence involves students using personal perspectives or value systems to evaluate situations. Students often demonstrate evaluation with written projects or class discussion since judgements from internal evidence are neither "right nor wrong." Students can utilize both internal evidence and external criteria if we have them create ethical dilemmas involving their values and the social work code of ethics or the values of social work and a social agency, etc.

Figure 7. Evaluation Level Test Items

---

1) Which of the following is the best operational definition?

|                            |                      |
|----------------------------|----------------------|
| Caring and loving behavior | Hitting behavior     |
| Homosexual behavior        | Slapping behavior ** |
| Violent behavior           |                      |

---

2) Turn to the study on page 184 in your textbook. The main **SAMPLING** problem in this study was that the sample:

|                  |                                   |
|------------------|-----------------------------------|
| Self selected ** | Did not match the population      |
| Was too large    | Was too small and too homogeneous |
| Was too diverse  |                                   |

---

3) What criteria did the agency most probably use to reject this research study?  
 "A social work agency rejects a proposed study because clients in crisis are assigned to a control group and will receive no service.

|              |                          |
|--------------|--------------------------|
| Researchable | Researcher interest area |
| Relevant     | Ethical **               |
| Feasible     |                          |

---

In figure seven, Item one requires students to judge which choice meets the criteria for the best (most behaviorally specific) operational definition. As with all the levels, students must recall all relevant definitions and evaluative criteria to answer the question. Item two has students critique and evaluate the weakness with the sampling method employed in a research study. In item three students must evaluate a research proposal with the criteria for conducting ethical studies (Williams, Unrau & Grinnell, 1998).

### CAUTIONS

In the social work curriculum, Bloom's taxonomy lends itself to knowledge level introductory courses, skill level practice methods courses, and obviously, to fieldwork where undergraduate students employ both social work knowledge and

skills. Social work educators can begin with a basic understanding of Bloom's taxonomy and with experience utilize a broader array of classroom activities and test items. However, there are several issues to consider when teaching and testing to higher knowledge levels in the social work classroom.

### Teaching

Curriculum alignment is a major consideration in the preparation of course materials because mastery of one knowledge level does not insure mastery of higher levels. For example, we cannot expect social work students to produce intervention plans (synthesis) after simply memorizing their elements (knowledge). Matching course content and testing to expected knowledge levels takes time and intention, but it has allowed me to increase my classroom "time efficiency" by more closely matching instructional time spent to what is expected on testing. In other words, I will spend less instructional time on "Mary Richmond" if students must only recognize her name and spend more time if students must critique her contribution to social work. Therefore, social work educators must decide in advance what material will be taught to higher and lower knowledge levels to plan teaching and testing accordingly.

Although the knowledge levels for teaching and testing should match, the examples used for teaching and testing should not match or students can simply memorize the examples. Therefore, we must develop a storehouse of examples intended for teaching or testing but not both. Having students produce unique examples of important concepts during brief classroom exercises is a creative way to accomplish this task. Valid examples students produce can be saved and

utilized for teaching or testing in future semesters. However, soliciting student examples opens us to receiving non-instructive examples. I brace myself when a student begins with "my ex-partner did this," or "I saw this on a TV talk show."

How do students react to learning to higher knowledge levels? Many students are unfamiliar with the terms "critical thinking" and "higher levels of knowledge." In their defense, I also was before using the taxonomy. Instead of telling students to "study harder," I now demonstrate my learning and performance expectations with short ungraded quizzes and classroom exercises similar to the knowledge levels expected on testing. Short ungraded quizzes reveal if students understand material to the expected knowledge levels. For example, often students believe they understand material better than they actually do and have few clarification questions before a quiz but have many questions after one. Short classroom exercises also reveal if students understand material to expected knowledge levels. As one example, I have students spend five minutes trying to operationalize "love" after learning about operationalizing variables. Students who cannot begin this task may be unable to do similar tasks in projects and exams.

Some students are skeptical when I demonstrate my learning expectations and seem content to simply memorize material (until the first quiz at least). Other students memorize concepts and the examples used to teach a concept, but also find they cannot apply their learning to new examples. Students must be told that studying by reading notes repeatedly will be insufficient for testing at the higher knowledge levels. In class I try to discourage these study methods by presenting,

for example, a range of different tables of results, requiring students to produce additional tables, and by clearly stating that testing will include new tables of similar difficulty.

### Testing

A simple way to begin incorporating Bloom's taxonomy into testing is to classify existing test items as either lower level knowledge (knowledge, comprehension) or upper level knowledge items (application, analysis, synthesis, evaluation). Classifying exam questions into two categories is initially easier than utilizing all six taxonomy levels and it will reveal what percent of an exam (or course) targets upper and lower knowledge levels. The sorting itself can be very instructive for new social work educators who utilize exams inherited from other faculty or exams taken from instructor manuals.

Gaining experience with the taxonomy can result in dissatisfaction with exams written by others that may not address the content we consider essential or address that content to the desired knowledge level (let alone both). I began writing my own exams and eventually writing instructor manuals for this reason (Aviles, 1999, 1998, 1997). I pilot test new (or revised) items by including them at the end of an exam. These items can be graded if they work correctly or ungraded and revised if they do not. Allowing students to ask questions about these items can reveal problems with an item, but it opens up the possibility of arguments about validity, reliability, or arguments for extra points. Establishing ground rules for this activity is essential or social work educators may quickly find themselves in what can feel like a "shootout." Pilot testing new or revised items

on ungraded quizzes is often painless because students freely describe problems encountered with items, but won't waste effort arguing for points on an ungraded quiz. Revised quiz items eventually appear on exams and additional quiz items are created.

As I gained skill with the taxonomy, I found myself wanting to test only upper knowledge levels and not 'waste' time testing simple memorization. However, this strategy made it difficult to determine why students answered items incorrectly. For example, if students forget the data needed to answer a knowledge question, that data will be unavailable to correctly answer items at higher knowledge levels. Therefore, incorrectly answered items at the evaluation knowledge level could mean a student needs additional practice with evaluation, or it could mean the student simply forgot the material required for an evaluation task. In the first case, the student may need more practice at the evaluation level. In the second case, the student may need to restudy the material, to get material from any missed classes, or (in rare instances) to purchase the textbook. I incorporate lower and upper knowledge level items in tandem on exams to determine if students incorrectly answered upper or lower knowledge level items (or both). Students answering lower knowledge level items incorrectly almost always cannot answer upper level items (e.g., If you don't know what the ANOVA is, forget about interpreting this table of results.).

Testing problems may involve a student's test-taking skills instead of problems with the taxonomy knowledge levels. For example, students may be accustomed to selecting the first choice recognized, often without fully reading

the question or all the choices. These students may need to slowly read the entire question and all the choices. Alternatively, students may need to spend less time reading items if they over-interpret test items or change their answers. On testing, social work educators may still find that students memorized or turned higher level material into easier to recall forms. One semester my research students seemed able to create examples of independent variables and correctly answered related quiz items. However, almost the entire class selected the same incorrect choice on a similar exam item! The students had reduced their knowledge of independent variables to an acronym (i.e., IVGF: Independent Variable Go First) and misidentified the first item in the title of a research study as the independent variable, although the title began with the sample! For correction I had students rearrange titles of research studies to demonstrate that while independent variables do occur prior to measurement of the dependent variable, they do not always "go first" in the title. Although such instances can make a social work educator long for retirement, correcting these problems can improve the quality of teaching and improve student performance on learning outcomes.

### CONCLUSIONS

One conclusion social work educators, especially new ones, may reach from this article is that achieving critical thinking can be a challenging process involving intention and advance preparation. To be honest, it does. Achieving critical thinking in the social work classroom is not a matter of increasing the sheer volume of material taught and telling students to study harder. Nor does

this process lend itself to writing exams the night before needed while trying to recall what was taught. The process takes time and intention but the effort is well worth it. The taxonomy has helped me clarify my intentions in teaching and testing and in creating course materials that match my expectations of student learning outcomes. The taxonomy also has allowed me to make my tests more challenging by teaching and testing to higher knowledge levels instead of by burying essential information within other information not intended for testing, or by making finer discriminations between response choices. Students often say that the course material is "tough but fair" (high praise from students). I hope all social work educators will try utilizing Bloom's taxonomy. The taxonomy can help social work educators gain greater clarity and precision about teaching, testing, and student outcomes as we all try to ascend into the rarified air of "critical thinking."

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